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Mathematical formulation of the problem of the routing of school transport

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Abstract

© 2018, Institute of Advanced Scientific Research, Inc. All rights reserved. -Nowadays in Russia there is a problem of transport provision of students. In Russia transportation of students on buses with a driver is poorly developed. School buses are usually bought in rural sparsely populated areas. In many cases the school does not have necessary means to invest in the bulk purchase of school buses. If there is a need for transportation of children one must resort to renting a bus with a driver. In Naberezhnye Chelny city there is no specialized transport for schoolchildren. A large number of students live too far from the schools. This situation leads to the fact that schoolchildren are late for their lessons, therefore, the quality of educational services is deteriorating. There is a need to create a transport system for schools. To ensure the transportation of students, the school transport system must be integrated into the public transport system. In this paper, we considered methods of modeling transport routes, such as the traveling salesman problem, the knapsack problem, the problem of school transport routing. A new model has been constructed to describe the routing of school transport. It is based on the previously listed problems. The constructed objective function minimizes the time that schoolchildren spend on their way from home to school. The objective function will tend to a minimum with the appropriate restrictions: the total number of schoolchildren who board the bus at the bus stops should not exceed the capacity of the bus; the bus must complete its route near the school; all schoolchildren must necessarily get on the right bus and get to school.

Keywords

Building the function, Finding the optimal route, Mathematical modeling, Minimizing the cost of the route, School transport, The knapsack problem, The problem of transportation of schoolchildren, The school bus routing problem, The traveling salesman problem, Transport infrastructure

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